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DESCRIPTIONS OF SOME NEW NORTH AMERICAN PSYLLIDAE WITH NOTES ON OTHERS

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Several new species of Psyllidae have come to hand since the preparation of the author's Monograph of the Psyllinae and Triozinae of America North of Mexico.[1] These are principally from material received from Montana State College and Massachusetts State College. These new forms are here described and new locality records and notes are given for some previously known.

Psylla rara[2] n. sp.
(Figs. 7, 8, 13)

Length to tip of folded wings 3.75 mm.

Color: General color fulvous. Five more or less distinct darker bands on mesoscutum. Venter often darker. Forewings with black spot at apex of clavus.

Structure: Head deflexed. Vertex ⅔ as long as wide, discally depressed. Genal processes large, acute, nearly as long as vertex (longer than its median length), slightly divergent. Antennae not quite twice as long as width of head, terminal setae very prominent. Thorax well arched. Forewings large, broad, about 2¼ times as long as wide, membrane thickly set with minute setae, costal margin setate; Rs slightly sinuate, Cu_1 strongly arched, pterostigma large, opaque. Hind wings large, minutely setate. Hind tibia with small basal spur.

Genitalia: Male genitalia moderately large. Proctiger long, parallel sided, straight to near apex, then abruptly bent caudad. Forceps shorter than proctiger, in lateral view slender, straight, tapered apically; in caudal view slender, parallel sided, arched to blunt black apices, large setae on inner margins. Female genital segment large, stout; dorsal valve longer than ventral, slender apically, blunt; ventral valve slightly upturned, acute.

Holotype, female, **allotype,** male, Huntington Ravine, White Mountains, New Hampshire, Sept. 4, 1940, altitude 3400 feet, J. F. Hanson. **Paratypes** as follows: one male Tuckerman's Ravine Trail, White Mountains, N. H., 4200 feet, Sept. 3, 1940, J. Hanson; one male Highlands, North Carolina, 4000 feet, June 11, 1940, C. P. Alexander; one female Smoky Mountains, Tennessee, 4000 feet, June 5, 1939, C. P. Alexander; two females Halifax, July 7, 1921.

[1] Iowa State College Journal of Science 17 (4):443—660, 1943.
[2] rarus-a-um, L. adj.—few in number, rare.

The holotype, allotype and paratypes are in the author's collection. Paratypes are also in the Mass. State College collection and the U. S. National Museum. The Halifax specimens are from the U. S. National Museum.

No host data are available for this species. It apparently is confined to some plant which occurs only at higher altitudes in the mountains of the eastern United States but should be more widespread in Canada. The specimens from Halifax were set aside several years past in the hopes that more specimens would be encountered. In the first of two shipments from Massachusetts State College three more specimens turned up and with two additional specimens at hand it is now being described as new. The author has hesitated so long in describing it as it has so few distinctive characters. It resembles **P. mali** more than any other species known to occur in North America. The much larger genal processes and the spot at the tip of the clavus will serve to distinguish it from **mali** however. It runs to the latter species in the author's key (op. cit.)

Psylla stricklandi (Caldwell)

In the Iowa State College collection there is one female specimen of this species from Blasdell, New York. It bears the date 7-15-92. Although undoubtedly of this species it differs from the western specimens by having antennae slightly over twice as long as the head.

Trioza sinuosa[3] n. sp.
(Fig. 6, 10)

Length to tip of folded wings 3.5 mm.

Color: General color fulvous, abdominal tergites brown. Forewings yellowish, most heavily along veins.

Structure: Head broader than thorax, Vertex deeply impressed, margins prominent. Genal processes large, stout, acute, scarcely divergent, nearly as long as vertex (longer than median length). Antennae 1½ times as long as width of head. Thorax broad, moderately arched. Pronotum depressed below plane of vertex. Forewings short, slightly over twice as long as wide, scarcely angulate, membrane thick; Rs long, sinuous, marginal cells small, radular areas unusually prominent. Hind wings large, thickly set with minute setae, somewhat rugose. Hind tibia with serrate basal carina, two inner apical spines. Metacoxae somewhat produced anteriorly, truncate.

Genitalia: Female genital segment much shorter than rest of abdomen; dorsal valve blunt apically; ventral valve shorter than dorsal, blunt.

Holotype, female, Jaffrey, New Hampshire, May 30, 1940, J. F. Hanson; one paratype same data; one, Great Gulf Trail, White Mts. New Hampshire, June 1, 1940, 1500 ft., J. F. Hanson; one, Limerick Mills, Maine, May 31, 1940, J. F. Hanson. Holotype and paratype in author's collection. Paratypes in Mass. State College collection and U. S. National Museum.

In general form this species resembles **T. tripunctata** but differs mark-

[3] sinuosus-a-um, L. adj.—sinuous.

edly in the immaculate forewings, the larger genal processes, the wing venation and the genitalia. There is no indication of host plant in the data at hand.

Trioza stylifera Patch

Numerous specimens of this species have been taken in the White Mountains of New Hampshire. Unfortunately no host plant data are available. The previously known collections were made at Brockville, Ontario and Herchmer, Manitoba.

Trioza pletschi n. sp.
(Figs. 1, 1a, 2, 12)

Length to tip of folded wings 3.5 mm.

Color: Male dark brown. Margins of vertex, median line on prescutum light. Legs lighter. Female testaceous, two brown spots on prescutum, indistinct lines on scutum. Dorsum of abdomen dark brown.

Structure: Head small, narrower than thorax. Vertex depressed discally, margins raised. Genal processes ⅔ as long as vertex, acute, somewhat divergent. Antennae slightly over twice as long as width of head. Eyes small. Thorax strongly arched. Pronotum strongly descending, not entirely below plane of vertex. Forewings 2½ times as long as wide, rounded apically; veins heavy, Rs long, sinuate, marginal cells of moderate size, radular areas unusually prominent. Hind wings large, minutely setate. Hind tibia with serrate basal carina, two inner apical spines.

Genitalia: Male proctiger large, short, caudal lobes as long as axial portion. Forceps enclosed by caudal lobes of proctiger, in lateral view very stout, sharply bent cephalad to acute apices; in caudal view stout, swollen basally, narrowed apically; in dorsal view apices produced latero-cephalad as blunt tooth, mesal margin sharp, black margined. Apical segment of oedagus much enlarged apically, scoop shaped, a smaller lobe basally. Female genital segment short; dorsal valve blunt, black tipped, slightly downcurved apically; ventral valve shorter than dorsal, stout, upcurved, blunt.

Described from 33 specimens collected at Fairy Lake, Gallatin County, Montana, September 4 and 10, 1939 and 1940 by D. J. Pletsch on **Thalictrum occidentale.**

Holotype male, **allotype,** female, in author's collection.

Paratypes in Montana State College and author's collections.

Almost all of the specimens are quite teneral so the color description can not be given with accuracy. This species keys out to **T. singularis** in the author's key (op. cit.).

It may be distinguished from the latter by the rounded forewings, the longer radial sector and the male genitalia as figured.

It is with pleasure that the author dedicates this species to D. J. Pletsch, the collector.

Trioza robusta [5] n. sp.
(Figs. 4, 5, 9)

Length to tip of folded wings 3.5 mm.

Color: General color orange red. Antennae, genal cones, legs, thoracic venter and abdomen darker with light markings.

Structure: Head large, as wide as thorax. Vertex with discal foveae and medial suture prominent. Genal processes conical, somewhat divergent, ⅔ as long as vertex. Antennae somewhat over 1⅓ times as long as width of head. Thorax quite well arched. Pronotum on same plane as vertex. Forewings angularly rounded, about 2½ times as long as wide, cubital cell larger than medial. Hind tibia with serrate basal carina, three inner apical spines. Metacoxae somewhat produced anteriorly.

Genitalia: Male proctiger nearly triangular in lateral view, caudal lobe not as long as axial portion, curved dorsad. Forceps about ½ as long as proctiger; in lateral view stout, rounded apically and produced cephalad to sharp points; in caudal view stout, straight, narrowed and incurved apically, apical portion black. Female genital segment shorter than rest of abdomen; dorsal valve strongly concave dorsally, apical portion attenuate, blunt, slightly longer than ventral; ventral valve thick dorso-ventrally, dorsal margin convex, covering central portion of dorsal valve in lateral view, apex acute and slightly upturned.

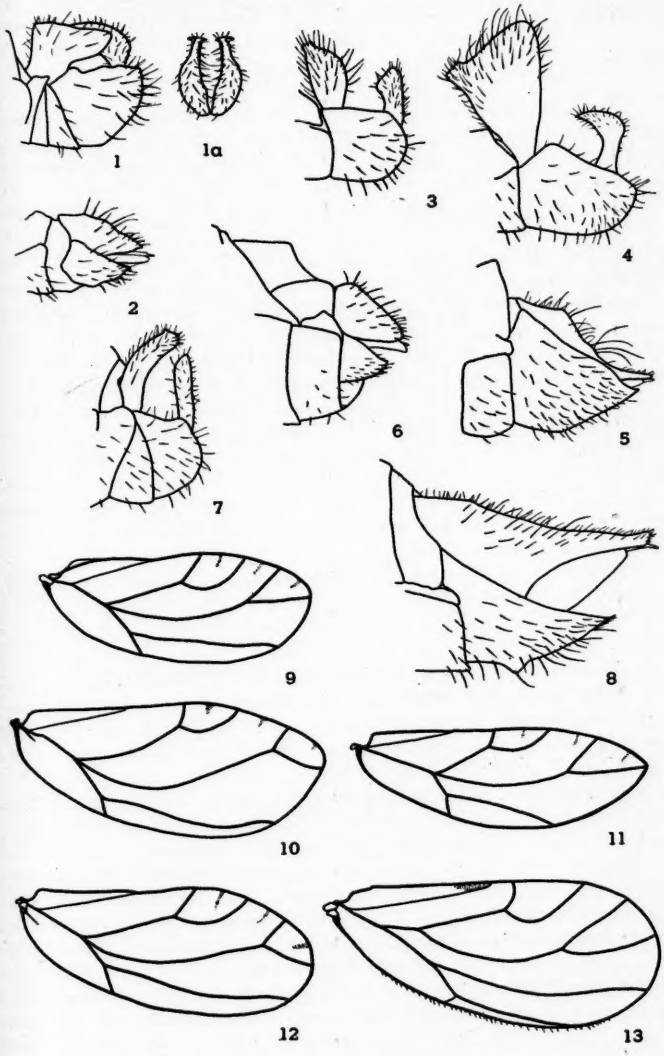
Holotype, male, Spring Hill, Gallatin County, Montana, Oct. 17, 1940, D. J. Pletsch; **allotype**, female, Langohr's Meadow, Middle Creek, Gallatin County, Montana, Oct. 7, 1939, D. J. Pletsch; 2 male and 3 female paratypes same data as allotype. All specimens taken on Douglas fir. One female paratype, Haugan, Montana, Aug. 9, 1931, R. H. Beamer. Holotype, allotype and paratypes in author's collection, paratypes in Montana State College collection and Snow Collection, University of Kansas.

This species is in the **T. frontalis** complex and resembles the latter very much. In the author's key (op. cit.) it runs to **T. sembla** Caldwell which it resembles in type of male genitalia. The accompanying figures will serve

[5] robustus-a-um, L. adj.—robust, strong.

EXPLANATION OF PLATE

1. **Trioza pletschi**, lateral aspect of male genitalia.
1a. **Trioza pletschi**, caudal aspect of male forceps.
2. **Trioza pletschi**, lateral aspect of female genital segment.
3. **Rhinopsylla caldwelli**, lateral aspect of male genitalia.
4. **Trioza robusta**, lateral aspect of male genitalia.
5. **Trioza robusta**, lateral aspect of female genital segment.
6. **Trioza sinuosa**, lateral aspect of female genital segment.
7. **Psylla rara**, lateral aspect of male genitalia.
8. **Psylla rara**, lateral aspect of female genital segment.
9. **Trioza robusta**, forewing.
10. **Trioza sinuosa**, forewing.
11. **Rhinopsylla caldwelli**, forewing.
12. **Trioza pletschi**, forewing.
13. **Psylla rara**, forewing.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to distinguish it from the latter. Although all the specimens at hand were taken on Douglas fir it is almost surely an **Amelanchier** inhabiting species as are its close relatives. Its occurrence on Douglas fir, so late in the fall, very possibly indicates hibernation on that plant.

Trioza aylmeriae Patch

Three specimens are at hand from N. Cottonwood Canyon, Gallatin County, Montana, collected May 11, 1940, by D. J. Pletsch. These specimens are identical with others from Maryland. Known heretofore from Ontario, Maryland and Ohio.

Rhinopsylla caldwelli n. sp.

(Figs. 3, 11)

Length to tip of folded wings 3.25 mm.

Color: General color fulvous. Eyes and clypeus dark. Wings hyaline.

Structure: Head large, nearly as wide as thorax, scarcely cleft anteriorly. Vertex broad, strongly impressed discally, medial suture strong. Eyes small, hemispherical, lateral, not extending forward. Genae roundly produced, as in **Kuwayama**. (Antennae missing). Clypeus large, extended, plainly visible from front. Thorax moderately arched. Prothorax very narrow, depressed below plane of vertex. Prothoracic episterna strongly produced, collar like. Forewings slender, angulate apically, 3 times as long as wide; costal margin strongly curved; Rs short, very slightly sinuate; medial cell larger than cubital. Hind wings slender, exceeding abdomen. Hind tibia with large basal spur, one outer and two inner apical spines. Metacoxae produced anteriorly.

Genitalia: Male proctiger arcuately produced on caudal margin, with a distinct apical epiphysis, longer than forceps. Forceps in lateral view spatulate, produced on cephalic margin midway; in caudal view stout, very slightly arched. Female unknown.

Holotype, male, Bonefish Key, Florida, Feb. 22, 1940, J. S. Caldwell. No host data. Type in the collection of J. S. Caldwell.

This unique male is undoubtedly related to the other species of Rhinopsylla although the genae are scarcely produced to give any appearance of a "cleft" head.

It is with great pleasure that I name this species for Dr. John S. Caldwell, the collector, a fellow psyllidologist and friend.

Aphalara nebulosa kincaidi Ashmead

Five specimens of this distinctive species are present in the Massachusetts State College material. All were taken at the Dolly Copp Camp, White Mountains, New Hampshire, June 1, 1940, by M. A. Hanson. Heretofore recorded from Alaska, Alberta, Washington, California and Colorado.

Psylla hamata n. n.

The name **Psylla uncata** Tuthill (Ia. St. Coll. Jour. Sci., 17: 498, 1943) is preoccupied by **Psylla uncata** Ferris and Klyver (Trans. and Proc. New Zealand Inst., 63: 53, 1932). The name **Psylla hamata** is proposed for **Psylla uncata** Tuthill.

LIFE HISTORIES AND CONTROL TESTS ON THREE INSECT PESTS OF SKINS STORED IN THE TANNERY[1]

FRED H. WALKER JR.
Boston, Mass.

Three species of insects were found feeding on skins at the A. C. Lawrence Leather Company, Peabody, Massachusetts. They were the hide beetle, **Dermestes vulpinus** (Fab.); the webbing clothes moth, **Tineola biselliella** (Hum.); and the red-legged ham beetle **Necrobia rufipes** (De G.). The hide beetle was of the greatest importance because it occurred each year in large numbers; the webbing clothes moth was present in sufficient numbers to cause damage during one of the years, while the red-legged ham beetle was found each year but in such small numbers that it caused little damage.

The skins which are known as shearlings except those on which the insects were found the first year were all of foreign origin. The foreign skins were brought in for storage in tightly packed bales in the dry salted condition during the spring and summer months. The domestic skins on which the insects were found during the first year were dried at the plant, salted, tied in loose bundles and stored in large piles. To control the insects in these piles, it was necessary to place the bundles in rows of smaller piles. The stored skins were placed in rows two bales high with aisles between the rows. The re-piling and rearranging of the bales was done to permit the entrance of some light and air into each bale or bundle. This arrangement made it possible to observe the amount of damage in each bundle and number of insects present. It also made the application of control measures easier.

THE HIDE BEETLE (DERMESTES VULPINUS FAB.)

The hide beetle is a cosmopolitan insect found throughout the United States and shows marked preference for skins. Certain merchants of London years ago offered a prize of 20,000£ for a "practical and effective remedy," for this pest. When cargoes of goat and other skins arrive in this country from Mediterranean regions, Australia and some South American countries, the damage is sometimes so extensive that the skins are refused entry. It is also a troublesome insect in establishments dealing in dried animal, dried fish and raw fertilizer materials.

The beetle which is oval in shape and robust, ranges from ⅜" to ½" in length and is reddish brown in color. The head is small and recedes ventrally. The thorax is not prominent and segmentation is indistinct on the ventral surface of the abdomen which is covered with grayish hairs.

The beetles are strong, active fliers and feed on a great variety of flowers and shrubs. They frequently gain entrance to buildings by flying through

[1] The author is indebted to the A. C. Lawrence Leather Company, Peabody, Massachusetts for whom this work was done and with whose permission it is published.

windows and other openings, or they may be brought indoors on flowers. This beetle may be found in some heated buildings at any time during the year, but they are usually more abundant during the spring and summer months. The anthrax bacillus may be taken into the digestive tract on food and passed through with no injury to the organisms.

DAMAGE TO SKINS

Both the larvae and bettles feed, but the greatest amount of damage is done by the larvae. The beetles were first found during these observations on a large pile of skins but were not noticed in large numbers until they began appearing on the outside of the pile, where they ate long, shallow furrows on the flesh side of the skins. The larvae fed on the flesh side of the skin away from the light. The younger larvae preferred the thick, greasy portion of the skin where they were found in colonies. The eggs propably had been deposited there. The larvae ate out channels on the flesh side of the skin and, in many places, penetrated through to the grain, but there was no feeding on the grain or in the wool. The damage was most severe in the thick, greasy parts of the necks, shanks and bellies. Damage extended to the bottom of the pile but it was confined to the edges of the skins even where they were not tightly packed. Neither the larvae nor the beetles were ever found inside of bales or in the center of bundles, but they were always present in the greatest numbers, just inside the pile away from the light on both damp and dry skins.

Both beetles and larvae were found weeding on a shipment of dry, salted skins from which the wool had been removed previous to shipment from Australia. The skins were prepared for shipment by piling them after butchering and allowing them to heat, causing bacterial action which loosened the woll and permitted its removal. The skins had been dried and tied in loose bundles with napthalene added and then shipped. The damage was so severe, especially to the grain because of penetration from the grain to the flesh side of the skin that they could only be used for inferior grades of leather.

LIFE HISTORY OF THE HIDE BEETLE

The life cycle of the hide beetle requires 60 to 70 days at average temperatures and humidity. The adult stage lasts for about 60 to 90 days and during which time they feed on skins. They are not negatively phototropic and may be found at windows trying to get outdoors to the flowers and shrubs. They are often found burrowing in the wool on the skins but no damage to the wool could be found. They mate and deposit their eggs in this stage. Actual oviposition was not seen. The eggs are laid on or near their food and require from three to ten days to hatch.

The newly hatched larvae are about ⅛″ in length and are nearly all deep reddish-brown in color. They seem to occur in colonies within the fatty portion of the skin. They remain in this stage for about six weeks and molt six times at about 5 to 8 day intervals, with an increase in size at

each molt. As the larvae increase in size, the whitish segmentation and mid-dorsal line becomes more apparent. The cast skins found among the skins are often mistaken for live larvae. During the larval stage they show definite negative phototropism and when they are exposed to light immediately seek shelter and darkness. In cases of adverse conditions they are known to remain in the larval stage from 1 to 3 years.

The larvae range in size from ⅛" in length in the first instar to ½" for the full grown larvae. The ventral surface is white and above there is a mid-dorsal line running from the reddish-brown head to the tapering tip. This line is nearly white but with a slight reddish tint. Each segment being reddish brown which is the predominating color of the larvae. The segmentation of light reddish-brown shows up most prominently in the advanced stages. The larvae is covered with reddish-brown hairs on which they carry debris. They can move with great rapidity propelling themselves with a smooth, rapid crawl.

Pupation takes place in or on the food. Pupae are often found in the wool and in the burrows often partially within the last cast skin. This insect will frequently pupate within lumps of salt in a burrow made by the larvae. The pupae are white in color and show little activity even when disturbed. The pupal stage lasts from 10 to 11 days. The newly emerged beetles are nearly white in color.

FOOD OF THE HIDE BEETLE

Confining beetles and larvae on different kinds of leather and skins gave the following results:

Chamois: Twenty-five beetles and ten larvae were confined with a piece of chamois on which they remained alive for only two weeks and damage to the skin was slight.

Suede: Twenty-five beetles were placed on this leather and they all died after doing little feeding.

Cowhide: Twenty-five beetles were placed on a piece of damp cowhide and all died in a short time, but when the hide was dried, another twenty-fice were introduced and they all trived.

Wet Shearling: Twenty-five beetles introduced on a piece of wet shearling all died in a short time without feeding.

INSECTICIDE TESTS AGAINST THE HIDE BEETLE

Fly Spray: Twenty-five beetles were thoroughly covered with "Flit" spray and, after eight hours, all the beetles were dead. The spray had little effect on them when first applied.

Orthodichlorobenzine: Twenty-five bettles were thoroughly covered with a spray of this material and after 10 to 15 minutes all were dead. The beetles showed discomfort from the instant they spray contacted them and the larvae curled up and died in a short time.

FUMIGATION TESTS

Crystals of paradichlorobenzine took much longer to volatilize than the liquid orthodichlorobenzine. These two fumigants were used in different areas with skins both covered and uncovered and at different concentrations of fumigants. Best results were obtained when orthodichlorobenzine was poured over the skins after which they were covered with paper. Only a few of the beetles succeeded in crawling outside the paper. In isolated and thoroughly covered piles, a concentration of two pounds per ten cubic feet was sufficient to obtain complete control.

Tests were conducted with orthodichlorobenzine and Dowfume 75 at room temperature (70°F) with a 24 hour exposure in sealed one gallon containers. The concentrations were reduced until both fumigants were only partially effective.

Material	Concentration	Adults	Larvae	Alive	% Kill
Dowfume 75	1-18,927	20	3	1 adult	95
Orthodichlorobenzine	"	20	3	0	100
Check	—	20	3	all	0
		Food Added			
Dowfume 75	1-18,927	20	0	0	100
Orthodichlorobenzine	"	20	0	0	100
Check	—	20	0	all	0
		Food Added			
Dowfume 75	1-37,854	10	0	7	30
Orthodichlorobenzine	"	10	0	4	60
Check	—	10	0	all	0

In the above tests, orthodichlorobenzine proved to be the most effective fumigant.

Skins stored in bales were fumigated with 66⅔% ethylene dichloride and 33⅓% carbon tetrachloride by volume or 61.5% to 38.5% by weight. The amount of fumigant used was 560 pounds of ethylene dichloride and 349 pounds of carbon tetrachloride making a total of 909 pounds of fumigants. The area fumigated consisted of 130,500 cubic feet. Six pounds per thousand is usually the recommendation. The room was then sealed after the liquid had been poured over the tops of the bales and the skins were exposed to the fumigant for 47 hours. The room was then opened and a check made to determine the effectiveness of the fumigant. The results proved to be unsatisfactory because many of the beetles and larvae were still alive.

The same room was fumigated 13 days later with the temperature maintained at 100 degrees so as to volatilize the fumigant and activate the insects. The fumigants used were applied at three different intervals, first, 300 pounds of paradichlorobenzine was used; twenty-four hours later 300 pounds was added and then ten days later 150 pounds of orthodichlorobenzine was used. The method of fumigating consisted of pouring the ortho-

dichlorobenzine over the tops of the bales and placing the crystals of para-dichlorobenzine under the burlap which covered the bales. After the skins were exposed to the fumigant for seven days a check was made as to effectiveness, the results were regarded as satisfactory since the kill was about 90%. This fumigation proved effective, although the concentration used was less than recommended.

METHODS OF CONTROL USED AGAINST THE HIDE BEETLE

The method of control finally adapted included the use of both a contact insecticide and a fumigant. The bundles were re-piled in smaller piles or, in the case of bales, placed in rows to allow for the penetration of a general fumigant and to reach each bundle or bale with a spray. The bundles were packed in piles with orthodichlorobenzine added at the rate of 3 pounds per cubic foot of skins. The fumigation either resulted in the death of the insect or drove them to the outside of the piles where they could be reached with a spray of orthodichlorobenzine. All openings within the area fumigated were closed up so as to confine the fumigant and insects and also prevent their spread.

Two other methods, namely, the use of lights at night and baits were tried but without success. Hydrocyanic acid gas was not used because of the danger to persons entering the room and leakage to other rooms, although it is a very satisfactory fumigant and is the one most often used on pests of stored products.

GENERAL RECOMMENDATIONS FOR THE CONTROL OF THE HIDE BEETLE

1. Prevention of an infestation.

a. Sanitation: Have place of storage cleaned before the skins are brought in. If beetles are present, fumigate or thoroughly clean the cracks and crevices in the wall and floor.

b. Mechanical exclusion: Have stored skins protected from the outside by screened windows and closed doors thus preventing the insects present from spreading or others from gaining entrance. If it is necessary to store infested skins, they should be isolated from other skins.

c. Proper storage: Skins should be piled in small piles 6 to 8 feet high and 3 to 4 feet wide if in bundles and if in bales should be placed in rows to permit access to each bale. This makes it possible to check the skins to see if insects are present before they become numerous and also permits the penetration of a fumigant if fumigation becomes necessary.

2. Control of an infestation:

a. Remove and put into process all infested skins at once, if possible. Care should be taken when moving the skins to prevent the infestation of other areas.

b. Fumigation should be done with a fumigant that has high killing

power and good penetration. Orthodichlorobenzine and paradichlorobenzine was used because they were safer.

THE WEBBING CLOTHES MOTH (TINEOLA BISELLIELLA HUM.)

This insect is well known as a pest of wool, feathers, dried insects, and nearly all animal products such as bristles, dried hair and leather. Fabrics injured by the clothes moth have holes eaten in them and, in most cases, the presence of the insect is indicated by silken threads over the surface of the material. This insect was found in the wool of the shearlings but no damage was found on the skin itself. Materials left undisturbed for some time or stored in dark places are more severely injured by these pests. Infestation of the shearlings took place previous to storage at the plant.

The moths which probably takes no food of any sort lay their eggs singly on the products on which they feed. Each female lays from 100 to 150 eggs. The eggs are small, about the size of the head of a pin of 1/50 inch long and are white in color. The larvae are white and vary in size from 1/16 inch long when first hatched, up to and over ¼ inch when full grown. The length of the larval life varies from eight weeks to four years, according to the conditions and food supply. Upon completion of their growth, the lavae change to white pupae about 1/16 inch long. The pupae turn brown in a few days and the adults emerge in three to four weeks. In heated buildings, the adults may be found at any time of the year, but are most abundant during the summer months. They began appearing in the shearlings late in July and emergence continued until late in the fall.

CONTROL OF THE MOTH

The control of the webbing clothes moth involved first, a light spray of orthodichlorobenzine, applied well into the bales to drive out the moths or put them to flight. Within a short period of time, a second spray was used to contact those which were in flight or those driven out to the surface of the bales. This method proved effective as evidenced by the numbers of dead moths at the base of the bales. It is also advisable to cover thoroughly the base of the bales for the second spray.

THE RED-LEGGED HAM BEETLE NECROBIA RUFIPES (DEG.)

This insect belongs to the family Cleridae. The genera of this family are all preditors with the exception of one genus **Necrobia**, which in all stages lives on carrion. The insects in this genus are known as "bone beetles" because they are usually found on saprophagous material after most of the flesh is gone, probably feeding on larvae of other insects in the same material.

The red-legged ham beetle is a cosmopolitan insect and is found feeding on drying meats, carrion, bones, fish, cheese and is especially destructive to stored hams. This insect does not attack paper, therefore materials wrapped in paper are protected.

These beetles were not present in sufficient numbers to do any damage, but in captivity they did considerable damage to the flesh side of the shearlings. About 50 to 75 beetles and several larvae were found well down in the pile between bundles on the flesh side of the skins. When they were exposed to light both stages showed decided negative phototropism.

The adults are from 3/16 inch long to ¼ inch long and from 1/16 to ⅛ inch wide. The dorsal portion including the head, thorax and elytra is a metallic blue-black. They have prominent red legs. The beetles are more active than **D. vulpinus** but not so robust. The head does not recede ventrally and they have distinct divisions between the head, thorax and abdomen.

The eggs are about ¼ inch long and hatch into white grubs which have brown heads. When the larvae mature, they reach the length of ½ inch. They have a narrow brown head, a brownish body covered with tufts of short bristles and bear two horny protuberances on the terminal segments. The lavrae are able to live two months without food. When they are disturbed or exposed, to light, they move with great rapidity for shelter. When ready to pupate, they make a curious and interesting cocoon in a rather novel way. They leave the fatty portion of the ham and gnaw their way either to the harder more fibrous parts of the ham or to a nearby beam. Here they make glistening white cocoons that resemble paper. The cocoon is not made of silk as is the characteristic of most insects, but it is composed of small globules of salivary secretions from the mouth of the insect. These globules adhere to each other and when they dry form the paper like cocoon.

It is stated in the literature that these insects are predacious in habit and feed on the larvae of insects which feed on the same foods, but during these observations they were not attacking the larvae of the leather beetle even when they were found in isolated areas.

The life cycle according to Dr. O'Flaherty is very similar to that of **D. vulpinus**, requiring about 100 days for its completion.

CONCLUSIONS

Of the three insects found feeding on skins, only one, the leather beetle caused losses. The webbing clothes moth was present in sufficient numbers to cause damage during one of the seasons, while the red-legged ham beetles were present in such small numbers that they caused little damage. The leather beetle was a pest on all dried skins if they remained stored for any length of time.

This work was carried on primarily to perfect control measures suitable to this particular situation, but while this was being done observations were made as to their life history and habits. The insecticides used for the control of these insects had to be non-poisonous when applied to the skins and the fumigant had to be as safe as possible as other floors in the same building were in use. They must not be injurious to the skins or

the leather making process unfavorably affected. The fumigant had to have a high killing power with good penetration. From the results of tests made on different materials, orthodichlorobenzine was used as a contact insecticide with paradichlorobenzine as a fumigant. These control measures have only temporary value, for if the skins are exposed outdoors for any period of time during the warmer months of the year they may become re-infested.

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DISTRIBUTION AND HOSTS OF ARKANSAS PHYLLOPHAGA (Coleoptera, Scarabaeidae)[1]

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Forty-four species of Phyllophaga are known to occur in Arkansas. Their distribution within the state, their seasonal distribution, the adult host

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plants, and their occurrence at light, is the subject of this report. Such information is an essential preliminary for the development of measures for control of a group that includes a large number of species, several of which may be abundant in one region and whose biologies and habits may differ.

This report is based upon records of more than 16,000 adult Phyllophaga the great majority of which were collected from 1938 to 1942. The principal methods of securing adults were by collecting them on host plants, at light, removing from soil, and by rearing from collected grubs and pupae.

Of the forty-four species of Phyllophaga known to occur in Arkansas, seven have been previously recorded from the state. It is to be expected that after more extensive records have been made a number of additional species will be found, for some have a range that may include Arkansas.

Most of the collections of Phyllophaga that have been made in Arkansas have been rather local and for the most part have come from the northwestern, southwestern, and east central sections. Consequently the relative numbers of species from these regions are greater than in other sections. Twenty-five species have been taken in Washington County, and twenty-two in Crawford County. Both counties are located in the northwestern part of the state. Thirty additional counties have records of one to sixteen species each. Notwithstanding the greater number of species recorded from Washington County, which is located in a hilly region, individuals appear to be less numerous than in the lowlands or river bottoms.

RELATIVE ABUNDANCE AND SEASONAL DISTRIBUTION

Table I includes all of the species of Phyllophaga now known to occur in Arkansas. The number of specimens of each species collected is indicated, and the earliest and latest dates of collection for each where known are given.

The total for each species, followed by a plus sign, indicates the minimum number of specimens collected or observed. In some cases, many more individuals of some species were observed on host plants and at light than indicated, but representatives only were taken.

The earliest and latest records in the state for the active occurrence of Phyllophaga adults are March 11 and September 6. No species is known to occur here throughout this period, but each is present during a particular part of the season.

Nine species have made their appearance in Arkansas in March, and fourteen, or more than one-third of the recorded species in the state, first appear in April. Others do not appear until May, June, or July.

SEASONAL ABUNDANCE

Many of the records in Table I were taken at irregular intervals, and it was not possible to indicate the period of greatest abundance for each

species. However, Table II shows the seasonal distribution and period of greatest abundance for sixteen species of Phyllophaga collected in a light trap in Washington County, Arkansas, during the seasons of 1941 and 1942.

TABLE I. Phyllophaga. Relative abundance and seasonal distribution of species in Arkansas

Species	Total collected	Earliest date taken	Latest date taken
P. crassissima	5,610+	April 25	July 29
P. bipartita	1,956	March 11	June 13
P. ephil. virilis	1,302+	June 8	Aug. 31
P. fervida	1,147+	March 25	June 7
P. praetermissa	1,000+	March 24	May 23
P. submucida	1,000+	June 14	Sept. 6
P. tristis	685+	March 21	May 23
P. arkansana	418+	March 28	May 30
P. profunda	281+	March 11	July 17
P. prunina	202+	March 25	June 28
P. micans	178+	March 21	June 12
P. crenulata	121	March 30	Aug. 13
P. delata	101+	May 10	June 14
P. forbesi	91	June	July 13
P. fraterna	57	April 12	June 12
P. implicita	49	May 15	July 12
P. congrua	46	April 26	May 1
P. horni	29	April 19	May 19
P. longitarsa	29	June 13	July 18
P. apicata	20	April 26	May 8
P. calceata	17	April 9	May 13
P. balia	17	April 20	May 23
P. vehemens	14	April 1	May 17
P. ilicis	13	April 15	July 13
P. sylvatica	11	April 21	April 26
P. forsteri	10	June 9	
P. karlsioei	10	April 2	May 21
P. quercus	8	July 13	July 23
P. rugosa	6	June 21	July 10
P. parvidens	6	April 25	
P. sacoma	5	May 4	
P. hirticula	4	April 27	June 14
P. gracilis	4	June 14	July 13
P. diffinis	4	April 7	May 8
P. vanalleri	4	June 2	June 14
P. angulata	3	July 12	Aug. 4
P. hirtiventris	3	June	July 12
P. anxia	3	May 17	May 29
P. futilis	2	May 9	
P. marginalis	1	May 2	
P. drakei	1	June 4	
P. aemula	1	July 18	
P. barda	1	May	
P. perlonga	?	?	

Sixteen species of Phyllophaga were taken in the light trap in Washington County during the seasons of 1941 and 1942. The first species appeared in April and records for the last species were in August. Several species occurred in considerable numbers over a period of two or three months. With the exception of **P. crenulata** (Froel.), which was collected over a period of four months, all other species had a seasonal distribution in this locality of one to three months. Most of the species occurred in May, and the total number of individuals of all species collected during this month exceeded the totals for April, June, July, and August combined.

DISTRIBUTION AND HOST RECORDS OF PHYLLOPHAGA

In the following discussion under each species of Phyllophaga, the counties from which the species was collected are given. Various plants on which the adults have been observed feeding are also indicated. Additional information is given for some species especially concerning their occurrence at light, observations of adult injury, and previous records of occurrence in Arkansas.

P. crassissima (Blanch.). Recorded from Washington, Crawford, Franklin, Logan, Pope, Pulaski, Clark, Jefferson, Arkansas, and Lee counties. More adults of this species have been collected in Arkansas than of any other Phyllophaga, and it has been one of the dominant species in white grub collections. Although occasional adults have been found feeding on elm, blackgum, and cultivated roses, the principal hosts were observed to

TABLE II. Phyllophaga. Seasonal abundance of species taken in light trap in Washington County, Arkansas, 1941 and 1942*

Species	Number collected each month				
	April	May	June	July	August
P. fervida	619	462	5	0	0
P. tristis	67	34	0	0	0
P. bipartita	253	382	0	0	0
P. balia	6	0	0	0	0
P. fraterna	1	0	0	0	0
P. horni	1	13	0	0	0
P. arkansana	1	82	0	0	0
P. prunina	0	7	4	0	0
P. karlsioei	0	1	0	0	0
P. micans	0	4	0	0	0
P. profunda	0	89	61	7	0
P. crassissima	0	2,866	1,623	59	0
P. crenulata	0	18	11	3	1
P. praetermissa	0	1	0	0	0
P. ephil. virilis	0	0	24	194	22
P. forsteri	0	0	1	0	0
TOTAL	948	3,959	1,729	263	23

* Total species and records for the two seasons combined.

be weeds especially the primrose **Oenothera laciniata**, Carolina cranesbill, buckhorn plantain, and curly dock. Also collected at light.

P. bipartita (Horn). Collected in Washington, Crawford, Franklin, Pope, Faulkner, Sevier, Miller, Hempstead, Nevada, Clark, Arkansas, and Desha counties. This species and **tristis** (Fab.) are the dominant oak feeding species so far collected. Taken on willow oak, post oak, black oak, Spanish oak, white oak, pecan, walnut, Chinese elm, wild plum, winged elm, blackberry, hawthorne, persimmon, pine, and cultivated roses. Abundant at light.

P. ephilida virilis Rein. Recorded from Washington, Crawford, Independence, Craighead, Hempstead, Arkansas, and Lee counties. This species has been collected and observed in considerable numbers especially on oaks and elm. Smaller numbers have been taken on hickory, wild grape, and hackberry. Also collected at light. This species and **submucida** (Lec.) were observed in July defoliating isolated elms near Batesville in Independence County. These two species have occurred later in the season in Arkansas than other Phyllophaga.

P. fervida (Fab.). Collected in Benton, Washington, Crawford, Polk, Miller, Hempstead, Nevada, and Faulkner counties. This species is one of the earliest to appear in the state, and nearly all of the individuals recorded were taken at light. It has been collected sparingly on pecan, blackgum, walnut, ash, oak, and persimmon.

P. praetermissa (Horn). Recorded from Washington, Crawford, Franklin, Logan, Miller, Hempstead, and Arkansas counties. This species is especially abundant at the Fruit and Truck Branch Experiment Station in Hempstead County where it was found feeding especially on elm and several species of oaks. It caused considerable damage to several rose varieties at this station feeding on foliage and floral parts. The adult host plants are willow oak, post oak, black oak, Spanish oak, white oak, overcup oak, elm, blackgum, wild plum, blackberry, hawthorne, and persimmon. Also collected at light.

P. submucida (Lec.). Collected in Benton, Crawford, Hempstead, Searcy, and Independence counties. Most of the specimens collected were taken in and near Batesville in Independence county where they were observed defoliating isolated elms. Also found in large numbers at light in Batesville. Other host records were hickory and hackberry.

P. tristis (Fab.). Recorded from Benton, Washington, Crawford, Franklin, Polk, Hempstead, Nevada, Bradley, Randolph, Independence, and Lee counties. This is a widely distributed species and probably occurs throughout the state. Most of the adults collected were taken on various species of oaks. Other host plants are pecan, persimmon, and cultivated roses. Also collected at light.

P. arkansana (Schffr.). Described from a male collected in Arkansas (Schaeffer, 1906) without indication of definite locality. It has since been collected in Benton, Washington, Crawford, Franklin, Logan, Pulaski, Polk,

Hempstead, Miller, and Union counties. Although most of the specimens were taken at light, adults have been collected on blackgum, sweetgum, and pecan.

P. profunda (Blanch.). Recorded from Washington, Crawford, Franklin, Logan, Sharp, Randolph, Lee, Arkansas, Desha, Bradley, Union, Nevada, Hempstead, Sevier, and Miller counties. Specimens have been collected on pecan, willow oak, black oak, post oak, white oak, blackjack oak, persimmon, sassafras, hickory, cultivated roses, hackberry, and at light. Although relatively few individuals of this species have been collected in the state, it is widely distributed and occurs on a variety of plants. This species and **bipartita** (Horn) are the earliest appearing species in the state.

P. prunina (Lec.). First recorded by Linell (1896) from Garland County. It has since been collected in Benton, Washington, Crawford, Franklin, Sharp, Randolph, Independence, Polk, Sevier, Miller, Hempstead, Clark, Ouachita, Union, and Bradley counties. It has been collected in the state on pecan, willow oak, black oak, pine, elm, cultivated roses, and at light.

P. micans (Knoch). Recorded from Washington, Crawford, Franklin, Sharp, Lee, Desha, Jefferson, Bradley, Clark, Hempstead, and Miller counties. It has been collected on sweet gum, black gum, pecan, elm, persimmon, and at light. Persimmon appeared to be a favored host.

P. crenulata (Froel.). Collected in Washington, Crawford, Franklin, Logan, Independence, Sharp, Lee, Jefferson, Desha, Chicot, Bradley, Ouachita, Clark, and Polk counties. It has been taken on pecan, black gum, black locust, elm, broadleafed plantain, curly dock, and at light. One specimen was taken in July at light on Mt. Magazine in Logan County. This is the highest point in the state with an elevation of 2,835 feet.

P. delata (Horn). Recorded from Pulaski, Arkansas, Drew, Clark, and Hempstead counties. Adults have been collected on willow oak, red oak, elm, hickory, pine, and sassafras.

P. forbesi Glas. Collected in Independence, Craighead, Lee, and Arkansas counties. It has been taken on apple, pecan, poplar, sycamore, black locust, hackberry, and at light.

P. fraterna Harris. Recorded from Washington, Crawford, Jefferson, and Hempstead counties. It has been collected on black gum, post oak, blackjack oak, and at light.

P. implicita (Horn). Collected in Franklin, Independence, Lee, and Chicot counties. Host plants for this species are black locust, willow, pecan, poplar, and sycamore. Also collected at light.

P. congrua (Lec.). Recorded from Washington, Crawford, and Franklin counties. Oak is the only known food plant for the species in the state. Also taken at light.

P. horni (Smith). Collected in Washington and Desha counties. No hosts are known for this species in the state. The recorded specimens were taken at light.

P. longitarsa (Say). Collected in Washington, Crawford, Independence, Lee, and Chicot counties. Specimens have been collected in the state on willow, poplar, sycamore, and at light.

P. apicata Rein. Recorded only from Crawford, Montgomery, and Miller counties. Specimens were taken only on oak. This species was originally recorded from Texas and Caddo Gap in Montgomery County, Arkansas. (Reinhard, 1939). It was described as a subspecies of **tristis** (Fab.) but is believed by the author to be a distinct species.

P. calceata (Lec.). Collected in Crawford, Franklin, Logan, and Arkansas counties. Specimens were collected on oak and at light.

P. balia (Say). Recorded from Washington, Crawford, Carroll, and Polk counties. It has been collected in the state on red oak, hickory, and at light.

P. vehemens (Horn). Collected in Washington, Crawford, Franklin, Lee, Bradley, Hempstead, and Miller counties. The few specimens taken were dug from soil or collected at light.

P. ilicis (Knoch). Recorded from Washington, Franklin, Sharp, Independence, Polk, and Clark counties. Collected on elm and at light.

P. sylvatica Sand. Arkansas was one of the original states from which the species was described (Sanderson, 1942). Collected in Washington and Crawford counties on persimmon, oak, and at light.

P. forsteri (Burm.). Collected only in Washington and Franklin counties. The few specimens collected were dug from soil and taken at light.

P. karlsioei (Linell). Described from a male and female collected at Hot Springs, Arkansas (Linell, 1896) in Garland County. Also found in Washington, Franklin, Clark, Hempstead, and Miller counties. The few specimens taken were collected on black gum, pecan, and at light.

P. quercus (Knoch). Collected only in Washington and Independence counties. One live adult and fragments of another were taken in July under leaves in oak-hickory woods. A few specimens were taken at light.

P. rugosa (Melsh.). Recorded from Washington and Sharp counties. No hosts are known in the state for this species, and most of the specimens were taken at light.

P. parvidens (Lec.). Collected once in the state at light in Union County.

P. sacoma Rein. Described from Texas and Arkansas (Reinhard, 1939). Recorded only from Nevada County.

P. hirticula (Knoch). Collected in Benton, Nevada, Jefferson, and Drew counties. The few specimens recorded were taken on pecan, blackgum, and at light.

P. gracilis (Burm.). Recorded from Independence and Hempstead counties. A few specimens were taken on oak.

P. diffinis (Blanch.). Specimens were collected in Washington, Lawrence, and Miller counties. Collected on oak and at light.

P. obsoleta vanalleri (Schffr.). This is the only species of the subgenus

Phytalus recorded from the state. A few specimens have been collected at light in Crawford, Lee, and Ouachita counties.

P. angulata Glas. Three specimens were collected in Independence and Arkansas counties at light.

P. hirtiventris (Horn). Recorded only from Lee and Arkansas counties. Collected at light.

P. anxia (Lec.). The three specimens collected were taken in Sharp, Lee, and Arkansas counties. No information accompanied the specimens concerning hosts.

P. futilis (Lec.). The two specimens taken were collected at light in Hempstead County.

P. marginalis (Lec.). One specimen was taken in Searcy County.

P. drakei (Kby.). One specimen collected in Washington County.

P. aemula (Horn). A single specimen was collected in Crawford County on willow oak.

P. barda (Horn). One specimen was taken in Randolph County at light.

P. perlonga Davis. This species was described from Arkansas, Mississippi, and Tennessee (Davis, 1920). The Arkansas material was taken in Clark County, and no additional specimens have been collected in the state.

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A NEW SPECIES OF ACINOPTERUS FROM CALIFORNIA

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Acinopterus parallelus Beamer, new species

Related to **A. brunneus** Ball but smaller, gray in general color instead of brown, margins of vertex more nearly parallel and basal processes of aedeagus much longer and more slender. Length male 5, female 6 mm.

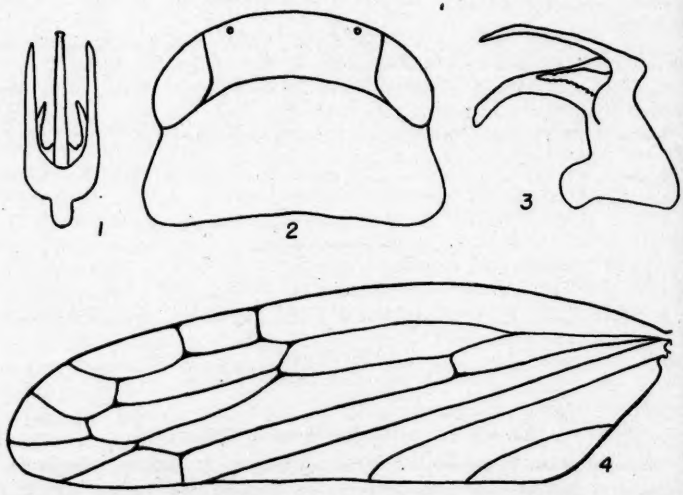
Head about as wide as pronotum, very short; vertex with disc broadly and shallowly excavated, margins practically parallel, about three times as wide as length at middle; elytra with mesal margin rounding before apex.

Color: Cinereous with veins more or less bordered with fuscous; males darker than females. Both sexes heavily pruinose throughout. Dorsum of abdomen black extending around more or less to venter with some blackening of legs.

Genitalia: Last ventral segment of female about two and one-half times as long as preceding, lateral angles broadly rounded, posterior margin greatly produced with semblance of a median notch. Aedeagus in ventral view with two pairs of processes, outer pair almost as long as shaft, quite slender, inner and lower pair about half as long as shaft, thicker, margins more or less serrate; in lateral view, shaft sharply curved dorsally on outer fourth; processes roughly paralelling shaft except not radically bent on outer fourth.

Holotype male, allotype female, 21 male and 18 female paratypes, Fillmore, California (Ventura County), June 11, 1942, H. H. Severin.

The almost parallel margin of the vertex of this species gives it its name and will separate it from other known species.



1 Dorsal view of aedeagus. 2 Head and pronotum. 3 Lateral view of aedeagus. 4 Wing.

TWO NEW SPECIES OF THE LAXITAS COMPLEX FROM MEXICO
(Hymenoptera, Eurytomidae)

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In a manuscript, which is awaiting publication, there is a table summarizing 31 new species of the genus **Eurytoma** from Mexico described by the author since 1941. Since the preparation of the table some additional material has yielded two more new species. Both new species, described below, belong to the Laxitas complex of the Mucronura group (Bugbee 1941). **Eurytoma laxitas**, a third member of this complex, was described in the paper mentioned above. The discovery of the two new species raises the total number of new species from Mexico to 33. A re-description of the Laxitas complex is necessary as formerly the complex was based only on **E laxitas**. The re-description follows:

MUCRONURA GROUP
Laxitas Complex (Bugbee 1941)

Female: Length, 4.1-7.9 mm.; average 5.56 mm. This complex contains some of the largest species in the whole genus **Eurytoma**. Abdomen, deeply oval in outline from the side and dorsally arched; extremely laterally compressed; width, from above, averages .96 mm. (range .65-1.4 mm.); depth, from the side, averages 1.96 mm. (range 1.4-2.7 mm.); thus the depth is equal to about twice the width; scaling on lateral aspect of segment 6, coarse, and it covers whole width of lower third of segment; recedes dorsally toward anterior margin; covers about ½ to ¾ of whole surface: posterior dorsal margin of segment 6 deeply emarginate; white pile covers segments 7 and 8 and posterior half of exposed tips of dorsal valves (9th abdominal segment); these valves long and pointed; average in length .80 mm. (range .45-1.2 mm.); valves project upward forming an angle of 45 to 50 degrees with the longitudinal axis of the abdomen; proximal half of valves naked and smooth or lightly shagreened; distal half pitted and covered with bristles; spiracle raised and in middle of a circular, triangular or elliptical area; segment 6 at its widest point averages .86 mm. (range .62-1.17 mm.) while segment 5 at its widest point averages .49 mm. (range .25-.87 mm.); thus segment 6 is about 1.7 times the width of segment 5. Genitalia average about 3.5 mm. in length (range 2.7-5 mm.) and 2.2 mm. in height (range 1.7-3.2 mm.; dorsal valves uniformly narrow for horizontal length; turn dorsally anteriorly at right angles and bend slightly backward; ventral vales turn dorsally anteriorly also and expand into a broad plate which bends backward upon itself; stylet arch in a vertical plane; angle formed by the horizontal and tangent lines ranges from 40 to 50 degrees. Thorax with the tegulae yellowish brown to black. Propodeum with a median depression

which maybe same width for entire length or slightly wider at top than bottom; central ridge straight and distinct only at top of median depression; rest of depression cut up into small square to rectangular areas; at base of depression is a narrow crescentic pit; areas lateral to depression with irregular pits and ridges. Legs with coxae black; femurs black or dark brown with yellow outer tips; tibiae also black medially with tips yellow; tarsi white; legs well covered with silvery white pile which is thickest on hind tibiae. Head narrow from above and flat across face; eyes bulgy laterally. Scape of antennae black, except for extreme base which may be brownish yellow to reddish brown. Wings average in length 3.9 mm. (range 2.8-5.5 mm.) veins light to dark brown in color; and not overly heavy for such large species; marginal vein averages in length .54 mm. (range .37-.75 mm.) and the postmarginal averages .25 mm. (range .17-.37 mm.); thus the marginal is more than twice the length of the postmarginal; stigmal club rectangular in shape with bottom gently rounded. Wing-body ratio of 1.46 (range 1.37-1.55).

Hosts: **Amphibolips** species of the niger complex on black oaks (**Quercus incarnata, Q Edwardi** and **Q. fulva**).

Range: West central part of Mexico in the states of Durango and Zacatecas.

Altitude: 7000-8500 feet.

The Laxitas complex may be told from the Mucronura complex by the much greater depth and different shape of the abdomen; more elongate posterior tips of the dorsal valves; deep emargination of the posterior dorsal edge of segment 6; the distinct host species; greater size and narrow 6 abdominal segment in relation to the width of segment 5.

The two new species which comprise the Laxitas complex, along with **E. laxitas**, are described below:

Eurytoma plana, n. sp.

(Mucronura Group; Laxitas complex)

Female: Length averages 4.4 mm. (range 4.1-4.7 mm.). Abdomen deeply oval in outline and laterally compressed; depth from the side averages 1.5 mm. (range 1.4-1.6 m..); width from above averages .70 mm. (range .65-.77 mm); thus depth is twice the width; 9th abdominal segment (exposed tip of dorsal valves) averages .56 mm. in length (range .45-.60 mm.); basal half shiney but surface finely shagreened; posterior half covered with silvery white pile; spiracle raised on a circular eminence in the center of a circular depression; dorsal valves along with ventral valves project upward forming a 45-50 degree angle with the longitudinal axis of the abdomen; lateral surface of 6th. abdominal segment coarsely scaled or pitted for whole width from base to about middle of segment; beyond middle sculturing fades out dorsally but reaches almost to dorsal aspect of segment along anterior border of segment; no white pile on segment 6 but thinly scattered over surfaces of segments 7 and 8; width of 6th abdominal segment at its widest

point averages .70 mm. (range .62-.77 mm.) and the 5th at its widest point averages .32 mm. (range .25-.37 mm.); thus the 6th is about twice the width of the 5th. Genitalia average 2.7 mm. in length and 1.7 mm. in height; dorsal valves, anterior to exposed tip, uniformly narrow for horizontal length; turn dorsally, anteriorly, at right angles; ventral valves turn dorsally also anteriorly, and expand into a broad plate which bends backward on itself; stylet arch in a vertical plane; angle formed by the horizontal and tangent lines equals 40 degrees; whole structure similar in proportions to **E. laxitas.** Thorax with the tegulae yellowish brown. Propodeum with rather shallow median depression which is about same width for entire length; central ridge irregular, with numerous short lateral ridges which divide area up into many small square to rectangular areas on each side of central ridge; at base of median depression is a curved, narrow pit or depression, succeeded by a convex area with surface lightly shagreened; areas lateral to median depression irregularly punctate; resembles most closely **E. laxitas.** Legs with coxae black; femurs black to dark brown except tips which are yellowish brown or lemon yellow; tibiae with some black to brown infuscation medially; tarsi white; white pile on femurs and tibiae thin; heaviest on hind-tibiae. Head, from above, with a flat face; eyes somewhat bulgy laterally; scape of antennae black except for brownish tinge to extreme base in a few. Wings average in length 3.0 mm. (range 2.8-3.1 mm.); veins light brown in color and not heavy; marginal vein averages .43 mm. in length (range .37-.45 mm.) and postmarginal averages .21 mm. (range .17-.25 mm.); thus marginal is twice the length of postmarginal; stigmal club rectangular in shape with a rounded bottom. Wing-body ratio averages 1.46.

Male: Length equals 3.1 mm. As there is only one male no further description is considered worth while.

Types: 6 females and 1 male. Holotype female, and paratypes of both sexes in author's collection.

Type Locality: Labels read, Otinapa, State of Durango, Mexico, 8500 feet elevation. Galls collected on November 14, 1931; males and females emerged summer of 1932.

Hosts: Labels read, from galls of **Amphibolips** (niger) **niger** Kinsey, on **Quercus incarnata.** For description of the host gall maker see Kinsey 1937, pages 443-444.

Range: Known only from Otinapa in the southwestern portion of the State of Durango.

E. plana is very close to **E. laxitas** (Bugbee 1941). The differences between the two species are chiefly in averages. **E. laxitas** averages larger than **E. plana** and this is carried over into a longer 9th, abdominal segment, marginal vein and depth and width of the abdomen.

The two species are found in the same locality although on different species of hosts on different species of oaks. **E. laxitas** occurs on **Amphibolips** (niger) **jubatus** Kinsey (1937) on **Quercus fulva,** a small scrub tree,

while **E. plana** occurs on **Amphibolips** (niger) **niger** Kinsey (ibid) on **Quercus incarnata**, a big tree form of black oak.

Kinsey (1937) pages 440 and 444 does not find the two hosts of **E. laxitas** and **E. plana** as closely related as is indicated for the two parasitic species. **Amphibolips jubatus**, host of **E. laxitas**, belongs to one chain of species (elatus-jubatus-maturus) while **A. niger**, host of **E. plana**, belongs to another chain (nebris-niger-pistrix). Both chains are within the **Amphibolips niger** complex, however. Although the parasites follow, in general, the same evolutionary pattern as their hosts as far as the complex they fail to show the same split within the complex. Actually, according to Kinsey, the host of **E. plana** is more closely related to the host of **E. ingens**, n. sp. described further on in this paper. Strangely enough **E. ingens**, although well within the limits of the Laxitas comple, shows evidence, as outlined under the description of **E. ingens**, of representing a distinct evolutionary branch within the complex apart from **E. plana** and **E. laxitas**. Therefore the situation is reversed in the parasites. The following table will illustrate this further.

Arrangement according to

Host Relationships (Kinsey 1937)			Parasite Relationships (Bugbee 1941-44)		
Chain	**Host**	**Parasite**	**Chain**	**Parasite**	**Host**
I	A. niger	E. plana	I	E. plana	A. niger
	A. pistrix	E. ingens		E. laxitas	A. jubatus
II	A. jubatus	E. laxitas	II	E. ingens	A. pistrix

Thus, although the evolutionary paths of both hosts and parasites hold very close together down to the complex, within the confines of the complex they part company and each has taken a different path. This is but one of the many startling but intriguing phases of the study of evolutionary problems.

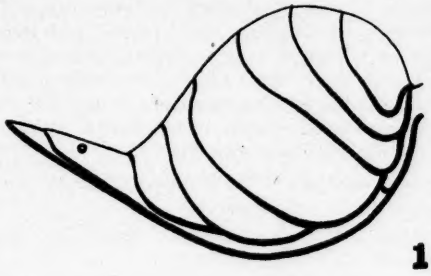
Eurytoma ingens, n. sp.

(Mucronura Group; Laxitas complex)

Figs. 1 and 2

Female: Length ranges from 7-7.9 mm.; average 7.4 mm.; one of the largest species of the genus **Eurytoma**; only species approaching it in size is **E. gigantea**, Walsh. Abdomen extremely laterally compressed; dorsally arched; averages in depth 2.6 mm. (range 2.6-2.7 mm.); averages in width 1.3 mm. (range 1.3-1.4 mm.); thus the depth is twice the width; 9th abdominal segment (exposed tip of dorsal valves) long and sharply pointed; averages 1.2 mm. in length (range 1.12-1.22 mm.); proximal half shiny and smooth or only faintly shagreened; distal half pitted and covered with short bristly hairs; spiracle raised on an elliptical eminence and placed in center of triangular to elliptical depression with apex pointed backward; outer tip maybe reddish to deep yellowish brown; dorsal valves, along with ventral valves, stick upward at a 45-50 degree angle in relationship to longitudinal axis of abdomen; silvery white pile scattered thickly over segments

7 and 8; practically none on segment 6; segment 6 at its widest point averages 1.15 mm. (range 1.15-1.17 mm.) segment 5 at its widest point averages .78 mm. (range .70-.87 mm.); thus segment 6 averages only 1.47 times greater in width than segment 5; lower ½-¾ of lateral aspect of segment 6 finely scaled or pitted; recedes dorsally toward anterior edge of segment but becomes coarser at base and covers whole surface of segment. Genitalia averages about 5 mm. in length and 3.2 mm. in height; dorsal valves narrow for horizontal length; turn dorsally anteriorly at right angles; ventral valves turn dorsally anteriorly also and expand into a broad plate which bends backward upon itself, thus forming a semi-circle; stylet arch in a vertical plane; whole structure massive; angle formed by the tangent and horizontal



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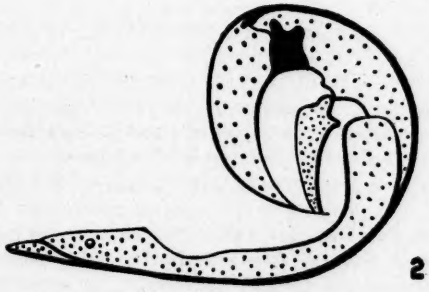

2

EXPLANATION OF DRAWINGS

(For drawings insects enlarged to 150 mm.)

Fig. 1 Abdomen of **Eurytoma ingens** n. sp.

Fig. 2 Genitalia of **Eurytoma ingens** n. sp.

lines equals 50 degrees. Thorax with the tegulae black to deep reddish brown. Propodeum with a narrow but distinct median depression; slightly wider at top than bottom; central ridge in upper ⅓ of depression divides it into two large irregular rectangles; below large rectangles are several ridges running across width of depression, defining 3-4 small rectangles; below basal rectangle is a much deeper pit which is succeeded by a raised area whose surface is finely shagreened; areas lateral to median depression with irregularly punctations and ridges. Legs with the coxae black; all femurs solid black except for lemon yellow outer tips; tibiae with considerable black medially tnd tips lemon yellow to almost white; tarsi white; all legs well covered with silvery white pile; head narrow and very flat across front from above; eyes noticeably bulgy laterally; scape of antennae all black except for extreme base which may show trace of deep reddish brown. Wings average in length 5.4 mm. (range 5.2-5.5 mm.); veins dark brown; not very heavy for so large a species; marginal vein averages in length .70 mm. (range .65-.75 mm.) and the postmarginal averages .32 mm. (range .30-.37 mm.) in length; thus marginal is more than twice the length of the postmarginal; stigmal club is rectangular in shape with a flat or straight bottom. Wing-body ratio averages 1.37.

Males: Only one specimen of the two males is in fair enough condition to use. It measures 4.4 mm. in length.

Types: 6 females and 2 males. Holotype, female, and paratype females and males in the author's collection.

Type locality: Labels read, La Mesa, State of Zacatecas, Mexico, 7000 feet elevation. Galls collected on November 21, 1931; males and females emerged July, 1932.

Hosts: Labels read: from galls of **Amphibolips** (niger) **pistrix** Kinsey on **Quercus Edwardi;** Kinsey coll. and det. For description of gall maker see Kinsey 1937, pages 444-445.

Range: The host of **E. ingens** was collected from only the single locality (La Mesa), which is located in the southwestern portion of Zacatecas. Specimens of **E. ingens** are recorded from the same locality only.

Eurytoma ingens is the largest species so far described in the genus **Eurytoma.** It averages larger in length than **E. gigantea** (Walsh 1870) which held first place up to the discovery of **E. ingens:**

E. ingens displays a close affinity with the Laxitas complex of the Mucronura Group. This complex is composed of two closely related species i.e. **E. laxitas** (Bugbee 1941) and **E. plana,** described in this paper. **E. ingens,** on the other hand, although close to **E. laxitas** and **E. plana,** represents a different evolutionary trend within the complex. Its great size and especially the black tegulae set it apart from all other species of the Mucronura group which have brown tegulae. It does not seem wise to erect a new complex on the basis of the black tegulae which seems to be just another example of not being able to depend on what appeared at first to be a good

diagnostic character. The instability of this character is akin to the case of the typopygial spines in the subgenus **Atrusca** (see Kinsey 1936, pages 32-35). In all other characteristics **E. ingens** fits perfectly into the Laxitas complex. A fuller discussion of its relationship to the other species of the Laxitas complex follows the description of **E. plana.**

E. ingens is easily differentiated from other species of the Laxitas complex by its large size, black tegulae, greatly elongated 9th. abdominal segment, specific host and distribution.

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NOTES ON LEPIDOPTERA

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Isogramma hageni (Grt.)

This Sphingid is double brooded in Sumner County, Kansas. The first brood appears in May and the first part of June, while the second brood appears in August. There does not seem to be any particular character by which to distinguish the broods, other than the time caught.

The moth is rather a late flyer, usually not appearing until after 10 o'clock p.m. Central Standard Time and flying until one or two o'clock a.m. The food plant of the larvae is the common hedge tree (Osage Orange) and the adult is found flying the hedge rows common in this vicinity as fences around farms.

The egg is green and round. The larvae is green with a few light bluish bars along each side of the body, being very similar to the larvae of **Pholus achemon** (Dru.).

The distinguishing character of **Isogramma hageni** is the greenish suffusion over the fore-wings and body. We have taken two specimens in which the greenish suffusion was replaced with a rich golden brown suffusion. It may be noted that the green coloring in **Isogramma hageni** is a

fugitive color. Spread specimens several years old have a yellowish-green color rather than the deep green of fresh caught specimens.

Melittia lindseyi (B. & B.)

This Aegeriid which was described from specimens taken in Seward County, Kansas, occurs in Sumner County, Kansas, and in Carson County, Texas.

This moth is usualy observed flying around its food plant the common Stink Gourd (**Cucurbita foetidissima**). The weather conditions seem to have no effect on its flying habits as it can be collected on cool, cloudy days during a high wind and on bright, still days. The favorite habitat for this moth appears to be the open prairie country where the Stink Gourd is found.

The life-history, worked out by H. A. Freeman of White Deer, Texas, is as follows: After mating the females lay their eggs on the upper surface of the leaves and on the stems of the Stink Gourd. The females may employ two methods for oviposition. The first method and most common one is for the female to rest quietly on the upper side of the leaves and lay the eggs in that position. The other method used is for the female to dash from one plant to another depositing an egg here and there over the stems as well as the leaves. A single female may lay as many as 250 eggs. The size of the egg is 2 mm. long; 1 mm. wide and .5 mm. high. It is oblong in shape and flat on the top and bottom and is reddish-brown in color. This is the stage in which the insect overwinters. After the plant dies and scatters over the ground the eggs will remain in this position until the latter part of May or early June when they hatch. Soon after hatching the tiny larvae move to the young stems of the gourd plant and bore directly into the vines. Here they feed on the plant tissue and go through five molts. As the larvae increase in size their presence can be detected from the outside by a swelling of the vine, locally called "galls." After the larvae have obtained their full growth they make a hole on the ventral side of the vine and dig down into the ground for a depth of three inches immediately beneath the hole from which they emerged. The vacated vine or stem section may be swollen for a length of six inches and to a width of from two to two and a half inches in thickness. After the full larvae has bored into the ground it prepares an earthen cell about two inches long and an inch and a half thick inside which pupation takes place, by this time it is around the latter part of July (For Kansas the latter part of August). The insect will remain in the pupal stage until approximately the middle of August (In Kansas until the middle of September). Aided by a sharp cutting projection on the cephalic end the pupae cut their way out of the earthen cell and assisted by sharp projections on each segment that point caudad, they move upward to the surface of the ground. There the pupal skin splits at the cephalic end and the moth crawls out and promptly locates some nearby weed or bush on which it crawls. It then assumes an upsidedown position

and the wings rapidly expand and dry. The entire performance requiring less than two hours. After this the moth flies away to carry on in the same way as its parents. The species is single brooded.

Melittia snowi (Hy. Edw.)

The life history of this Aegeriid is almost identical with that of **Melittia lindseyi**, except of course the fact that the adult being much smaller than **lindseyi**, the egg and larvae of **snowi** are smaller.

Snowi feeds on the Stink Gourd as does **lindseyi**. The main difference in their life history being that **snowi** winters over in the cell, the adult emerging in June and July. The larvae leaves the Stink Gourd Vine in September and October to pupae in the ground. A few of the earlier larvae to mature will pupate and emerge in October but the vast majority will winter over in the cell to emerge the following June and July.

A REVISION OF NORTH AMERICAN OMPHRALIDAE (Scenopinidae)

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With the exception of the common "window fly" **Omphrale fenestralis** (Linn.) members of this family are not well known and are very poorly represented in collections. The writer has quite often encountered these interesting flies while sweeping grasses and other vegetation for Dorilaidae and with the aid of the University of Kansas Biological Survey party has been able to build up a comparatively large group of them in the Snow Entomological Collections. As far as is known the larvae are predaceous, some of them are no doubt of economic importance.

In most of the Omphralidae which have been studied the male genitalia are completely turned over so that the ninth tergum, cerci and anal region are situated on the venter and the coxopodites and clasping structures are dorsal in position. In Pseudatrichia the structures appear to be normal in position, while in all of the males of Belosta which have been studied the genitalia seem to be twisted to the side. In most genera the ninth tergum is folded around the genital structures and serves as a protective covering. The aedeagus is usually three pronged and the clasping structures are rather simple, usually poorly developed.

Key to North American Genera

1. Apical cell closed and petiolate 2
   Apical cell open 5
2. Body covered with scales ..... **Metatrichia** Coquillett
   Body without scales 3

3. Fork of vein R_{1+5} located at or beyond middle of apical cell (R_5); pro pleurae with a hirsute process on each side just above front coxae 4
Fork of R_{4+5} near base of apical cell; propleurae without such a process ..... **Brevtrichia** n. gen.

4. Mouthparts well developed; palpi slender, arising on lateral margins of mouth; head longer than high ..... **Pseudatrichia** Coquillett
Labellum scarcely visible, palpi thick and clavate in shape, arising near median portion of face; head slightly higher than long. ..... **Belosta** n. gen.

5. Body clothed with scales ..... **Omphralosoma** Kröber
Body without scales ..... **Omphrale** Meigen

Metatrichia Coquillett

Metatrichia Coquillett, 1900, Ent. News 11, 500.

Members of this genus resemble **Omphrale**, they are distinguished by the more robust body, more greatly arched thorax; by having the body clothed with bulblike scales; the apical cell (cell R_5) is closed and petoilate and the suture between the scutellum and the mesonotum is very narrow not wide and distinct as in other genera.

Genotype: **Metatrichia bulbosa** (Osten Sacken)

Metatrichia bulbosa (Osten Sacken)

Scenopinus bulbosa Osten Sacken, 1877, West. Dipt., 275.

This species is readily distinguished by the generic characters and has been adequately described by previous workers. It might be of interest, however, to note that the mouthparts are very well developed, filling the entire facial depression. The labellum is large and fleshy and extends to bases of antennae. The palpi are lateral in position, are long slender and flattened at apices, they extend almost the full length of the facial depression. The facial depression is deep, sides vertical; the portions of the face along the eye margins are very narrow.

This is the only species known from North America, the only other New World species is **M. robusta** Kröber,[1] described from Paraguay. **M. bulbosa** is a rather common and wide spread species throughout the middle west and western United States.

Type locality, Missouri. Type in Cambridge Museum of Comparative Zoology.

Specimens have been seen from Arizona, California, Kansas, Michigan, Missouri, Oregon, South Dakota and Texas.

Brevitrichia new genus

Related to **Pseudatrichia**, all of the described species have been placed in this genus. The known **Brevitrichia** are of smaller size, with rather broad, more robust bodies, especially in the males. The head is higher than long and the males are holoptic or nearly so. The antennae are broader and

1 1913, Krober, Ann. Mus. Nat. Hist., 11, 180.

shorter with the two apical points more acute (fig. 4a). The third antennal segment is more thickened at base and tapered toward apex, scarcely two times as long as greatest width. The front is gradually sloped, never horizontal. The portions of face along the eye margins are very narrow and the facial depression deep with vertical sides. The mouthparts are well developed, filling one-half or more of the facial depression; the palpi are slender but short, extending about one-third the distance from the base of mouthparts to the antennae. Occiput weakly developed, rather narrow and never produced above the upper margin of the eyes. Propleurae with- base of the apical cell (R_5) (fig. 4b); petiole of apical cell less than half out a hirsute development. Wings short, fork of vein R_{4+5} situated near the the length of vein R_4. Sides of abdomen rather straight, segments not dilated. The genitalia of both sexes are very different from **Pseudatrichia,** the females possess an apical circlet of spines and the males have large ventral plates surrounding the genital structures.

This genus appears to be related to **Pseudomphrale** Krober but doesn't fit his inadequate description.

Genotype: **Brevitrichia griseola** (Coquillett) **(Pseudatrichia).**

Key to North American **Brevitrichia**

1. Abdomen shining black with white lateral margins. Disc of scutellum black, margin yellow. Third antennal segment about two times longer than second ..... **insulana** (Cole)
   Abdomen largely yellowish or white or with only markings of black; in the females sometimes light brownish. Third antennal segment four or five times longer than second 2
2. Legs chiefly brownish yellow; abdomen of male chiefly yellow to white ..... **griseola** (Coquillett)
   Femora black, abdomen definitely marked with black ..... **helenae** (James)

Brevitrichia griseola (Coquillett)
(figs. 4a, b)

Preudatrichia griseola Coquillett, 1900, Ent. News 11, 501.

This species is usually predominantly yellowish in color with the thoracic and abdominal markings brownish to black; the mesonotum is mostly black with lateral margins yellowish and with three faint grayish brown vittae. Hind portion of mesonotum usually with a large square shaped yellow spot medianly, this is partially to completely divided by a median longitudinal line of black; this portion varies from this condition to almost black. In some specimens yellowish striae extend from the hind portion of the mesonotum to or beyond the middle. The scutellum is chiefly yellowish with a black median spot of varying size. The legs vary from yellow to brownish and the abdomen is usually largely yellow with narrow brownish bands on anterior margins of segments.

The coloration seems extremely variable in this species.

Length male: body, 2.6 mm. to 2.8 mm.; wing, 2.0 mm. to 2.2 mm.

Length female: body, 3.6 mm. to 4.2 mm.; wing, 2.2 mm. to 2.4 mm.

Type locality, Mesilla, New Mexico. In U. S. National Museum.

This species is rather common in grassy situations in the West. Specimens are at hand from numerous localities in Arizona, California, Idaho, New Mexico and Texas. One female specimen has been studied (in U. S. National Museum) from El Rancho, Guatemala, El. 900 ft., Feb. 7, 1932 (C. N. Ainslie), this seems to compare in all respects.

Brevitrichia helenae (James)

Pseudatrichia helenae James, 1938, Jour. Kans. Ent. Soc., 11, 22.

In his discussion of this species Dr. James states: "Related to **P. griseola** Coq., but smaller in size, the abdomen is definitely marked with black, the femora are black and the knobs of halteres are white." In a large series of **B. griseola** all of the above characteristics are covered by the variations. The color appears to be extremely variable and is not a consistent character. The specimens of **B. griseola** average the same size as **B. helenae** and a homotypic specimen compared in all respects. This is probably just a color variation but until more specimens have been examined it is perhaps best to retain its specific rank.

Type locality: Roggen, Colorado.

Type in collection at Colorado State College.

Specimens fitting **B. helenae** are on hand from Lusk, Wyoming, July 14, 1937 (R. H. Beamer, C. L. Johnson); Strasburg, Colorado, June 21, 1937, (R. H. Beamer); Leeds, Utah, Aug. 9, 1936 (R. H. Beamer) and Mountain Park, N. M., June 27, 1940 (R. H. Beamer).

Brevitrichia insulana (Cole)

Pseudatrichia insulana Cole, 1923, Proc. Cal. Acad. Sci.

This species appears to be distinctive in having the abdomen chiefly shining black, the pleurae black with some yellow marks and the third antennal segment short compared to the length of the second. The antennae are black. The disc of the scutellum is black with the margins yellow. The dorsum of the thorax possesses three grayish brown vittae. The stems of halteres are brown and the knobs white. The femora and apical portions of tibiae blackish, the hind tibiae are largely yellow while the first two pairs are largely brownish.

Length of male, 2.75 mm.

Length of female, 5.8 mm.

Type locality: Mexico.

Type in the California Academy of Sciences. The writer has not seen this species.

Pseudatrichia Osten Sacken

Pseudatrichia Osten sacken, 1877, West. Dipt., 275; change of name for **Atrichia** Loew, 1866, Cent. 7, 76.

Members of this genus are rather large, very slender, metallic black or blue-black in color and almost devoid of conspicuous hairs. The head is longer or at least as long as high. Occiput swollen on upper portion, usually extending above the eye margin. Facial depression deep; sides of face along eye margin sharply sloped, almost vertical in the male. Mouthparts well developed, extending over half way to bases of antennae; palpi slender, extending almost to tip of labellum. Third antennal segment not greatly thickened medianly, usually about three times as long as wide, sides nearly straight (fig. 2a). Front horizontal, sloped only near the antennae. Propleurae with a warlike hirsute development on each side just above front coxae. Fork of R_{4+5} situated at or beyond the middle of apical cell (R_5). Petiole of apical cell, vein $R_5 + M_{1+2}$ over half the length of the free portion of R_5. Wings slender, three to fuor times longer than greatest width. Abdomen elongate in both sexes, the segments slightly narrowed at bases so that they appear to overlap. The abdomen of both sexes has a pair of slightly raised velvety spots in middle of second tergum, these are surrounded by a polished area. The female genital structures are more strongly devoleped than those of the male and are without a circlet of spines at apex. The male structures are completely hidden within the eighth abdominal segment.

Genotype: **Pseudatrichia longurio** (Loew).

Key to North American **Pseudatrichia**

1. Legs brown to black, front opaque, larger species, 8.0 mm. in length ..... **longurio** (Loew)
   At least front legs and coxae, trochanters and tarsi of others yellowish; front polished, usually smaller species, 4.0-6.66 mm. 2
2. Middle and hind femora and tibiae black; head conspicuously longer than high; front of female rather narrow, not as wide as ocellar triangle; small species, 3.7 mm. in length ..... **parva** n. sp.
   Legs chiefly yellow; head about as high as long; front of female broad, much wider than ocellar triangle; larger species, 5.5-7 mm. 3
3. Second and third abdominal segments white on posterior margins, above and below ..... **albocincta** Van Duzee
   Abdomen without white margins on segments, although the conjunctiva is white ..... **unicolor** Coq.

Pseudatrichia albocincta Van Duzee

Pseudatrichia albocincta Van Duzee, 1926, Pan. Pac. Ent., 2, 164.

This species is known only from the male, it is closely related to **P. unicolor** but appears to be distinct in having the second and third abdominal terga and sterna margined with white posteriorly. The head is about as high as long, front nearly horizontal. The body is chiefly black and the legs almost entirely yellow; palpi yellowish white; mesonotum with a small yellow spot back of humeri and another back of wings, these are connected by a narrow white line. Thorax and abdomen somewhat granulate, nearly

bare, apical portion of abdomen and genitalia with a few pale hairs. Knobs of halteres white. Wings hyaline, veins yellowish; the fork of vein R_{4+5} is located at the apical third of cell R_5.

Length: body, 6.0 mm.; wing, 4.0 mm.

Type locality, Bradley, California.

Type in California Academy of Sciences. Dr. Edward S. Ross of the California Academy of Sciences has sent the writer information concerning the structural characters of the type.

Pseudatrichia longurio (Loew)

Atrichia longurio Loew, 1866, Cent. 7, 76.

This species should be readily recognized by its large size, its brown to black legs and opaque front. According to the original description the third antennal segment and the male genitalia are dark rufous; the humeri and scutellum yellowish or brownish; wings grayish hyaline, veins brownish.

Length 8.0 mm.

Type locality: Mexico.

Type in Cambridge Museum of Comparative Zoology.

The writer has not seen this species.

Pseudatrichia parva n. sp.
(figs. 2a, b)

This species is related to **P. unicolor** Coquillett but is readily distinguished by its small size; elongate head and thorax; chiefly black legs and black conjunctiva, shorter more robust third antennal segment, narrower front of female, front distinctly raised, especially on lower portion; the mouthparts are more developed and the sides of face more narrow.

Female.—Head: Entirely black or brownish, excepting the reddish brown eyes. Head produced forward, about one-fourth longer than high; antennae situated at or slightly below the median portion of head as seen from side view (fig. 2a). Occiput strongly developed, swollen above and behind, upper portion developed into a ridge extending above the eye margin. Front narrower than ocellar triangle, slightly convex, especially on lower portion so that from lateral view the lower part projects out from the eye margin. The antennae are brownish black, covered with miscroscopic pubescence and a few fine hairs on second segment; third segment shorter, more broad than in any other Pseudatrichia known to the writer, it is about two times as long as its greatest width. The facial depression is deep with vertical sides; the sides of face extending horizontally from the eye margins are very narrow. Mouthparts well developed, filling most of the facial depression; palpi slender, extending about three-fourths the distance from the base of mouthparts to the tip of labellum. **Thorax:** Metallic black on mesonotum, brownish black on the sides. Almost devoid of pile; mesonotum finely rugulose. Thorax elongated, almost twice as long as high; mesonotum produced forward on anterior portion. Propleurae with a well developed tubercle above the front coxae. Stems of halteres brown, knobs

white. **Legs:** Front pair chiefly yellowish except for the brown apical portion of tarsi; femora and tibiae with a brownish tinge. Middle and hind legs chiefly dark brown to black, except for the yellow coxae, trochanters and basitarsi. All leg joints slender. Post tibiae as long as femora; basitarsi about equal in length to remaining subsegments. **Wings:** Fork of vein R_{4+5} situated beyond the middle of the apical cell; vein R_4 sinuate; vein R_5+M_{1+2} about equal in length to the free portion of R_5. Crossvein r-m situated at apical three-fourths of the discal cell (fig. 2b). **Abdomen:** shining brownish black with a slight brown tinge, more black on the margins of the sclerites. Entire abdomen finely punctulated. The dorsal marking of the second tergum mostly shining black. Abdomen bare except on genital portion. Genitalia well developed, thickly covered with pale hair, especially on the ventral portion.

Length: body, 3.7 mm.; wings, 2.7 mm.

Male unknown.

Holotype, female, Flagstaff, Arizona, July 8, 1941 (R. H. Beamer).

Type in Snow Entomological Collections.

Pseudatrichia unicolor Coquillett

Pseudatrichia unicolor Coquillett, 1900, Ent. News, 11, 500.

(fig. 3a)

This is a moderately large species characterized by its yellow legs and metallic black abdomen. The head is about as high as long, the occiput somewhat swollen above but not greatly so behind. Eyes of male narrowly separated on the front, front slightly less than the width of median ocellus; front of female broad, much wider than ocellar triangle, rather flat, not convex or produced below. Third antennal segment almost three times as long as wide. Thorax and abdomen chiefly metallic black, finely rugulose, pleurae brownish, humeri and posterior calli yellowish. Stems of halteres brown, knobs white. Legs yellow, tarsi brownish. Fork of R_{4+5} slightly beyond middle of apical cell (R_5) vein R_5+M_{1+2} shorter than free portion of R_5. Conjunctiva of abdomen white, terga with sparse recumbent pile, more noticeable on sides; posterior portion of abdomen and genitalia rather thickly pale haired. Male genitalia hidden inside of the eighth segment.

Length of male: body, 5.4-6 mm.; wings, 4.0 m..

Length of female: body, 6.6-7 mm.; wings, 4.33 mm.

Type locality: Las Vegas, New Mexico.

Type in U. S. National Museum.

The writer has seen specimens from Cloudcroft and Alamogordo, New Mexico (these are the specimens recorded by Cresson[2]); from type locality, August 11, (H. S. Barber) and from Florissant, Colo., July 11 (S. A. Rohrwer).

Belosta new genus

In general body shape these flies resemble **Metatrichia** but the structural characters, aside from the shorter more robust body, show it to be

[2] 1907, Trans. Amer. Ent. Soc. 33, 118.

more closely related to **Pseudatrichia.** This genus is distinct from all genera of Omphralidae known to the writer by having atrophied mouthparts. It is distinguished from **Pseudatrichia** by having the head higher than long, instead of longer than high; the third antennal segment rounded at apex, not square tipped; mouthparts very inconspicuous and small, almost hidden by the palpi; palpi arising near median portion of face, clavate in shape and extending scarcely over one-third the length of the facial depression in the females (fig. 13a) and not quite one-third the length in the males. In **Pseudatrichia** the mouthparts are well developed, filling over half the facial depression, the palpi are long and slender, not enlarged apically; the palps are lateral in position and extend over one-half the length of the depression (fig. 13a). The facial depression is rather shallow in **Belosta,** in some females the face is scarcely concave; the sides of the face along the eye margins are almost flat in the females and gently sloped in the males; the occiput is not at all developed above. **Pseudatrichia** have a deep facial depression, the sides of face are sharply sloped so that the edges along the eye margins are rather acute; the occiput is developed above the eye height. The thorax of **Belosta** is strongly humped, the height is equal to its length and the mesonotum, mesopleurae and sternopleurae are densely haired except in **B. flaviceps** (Coq.). **Pseudatrichia** have the thorax longer than high and have only sparse microscopic pile. The front of females of Belosta is much more broad than in **Pseudatrichia,** that of the males is somewhat more narrow above; the abdomen is more broad, not so elongated and the genitalia of both sexes are very differently developed from the related genera.

Genotype **Belosta albipilosa** n. sp.

Key to Known Species of **Belosta**

1. Thorax distinctly pilose, thickly covered with neatly erect pile 2
   Pile of mesonotum microscopic and recumbent ..... **flaviceps** (Coq.)
2. Face and occiput of female chiefly yellow-white, facial depression of male mostly white around sides, front yellow at or near the antennae. Thorax moderately pilose, pile entirely pale yellow ..... **albipilosa** n. sp.
   Front and face black, pile of mesonotum long, mixed black and white, posterior portion of mesonotum with two narrow streaks of golden pile narrowly separated by the black pile ..... **pilosa** (Coquillett)

Belosta albipilosa n. sp.

Related to **B. pilosa** (Coquillett) but not so densely pilose, with yellow to white markings on the front and face of both sexes and the thoracic pile is entirely pale yellow. The genital structures of male are distinctive.

Female.—The following characters are supplementary to the generic description. Species chiefly shining black with pale pile. **Head:** Face and front, margin of occiput chiefly yellow-white; hind portion of occiput and lower part of face brownish black; face with a flat dark colored spot at lower margin of each eye. Front yellowish along the eye margins, brownish in

middle, ocellar triangle and antennae black. Facial depression largely white, the bottom portion brownish; palpi yellowish at bases, blackened at apices; the visible mouthparts are brownish black. Antennae finely pubescent, first segment very short, less than half the length of the second; the third segment is strongly thickened through median portion and rounded at apex (fig. 13b). The only visible mouthpart, aside from the appendages, appears to be just a small knoblike development between the palpi near their bases, this seems to be a rudimentary labellum, it is probably not functional. The palpi are short and thick, distinctly enlarged apically. Front broad, three times the width of the ocellar triangle. **Thorax:** nearly two times as thick dorsoventrally as the head is high; mesonotum strongly arched. Chiefly shining black in ground color, margins of humeri and the posterior calli yellowish white; pteropleurae yellowish brown, all of the revealed conjunctiva around wing base and bases of legs white. Propleurae with a wartlike process just above the front coxae, this is covered with fine pile. Stems of halteres dark, knobs pale. **Legs:** almost entirely black, knees narrowly yellow, all joints slender, femora scarcely swollen, tibiae straight. Posterior metatarsi slightly longer than rest of the tarsi. Pile entirely pale yellow. **Wings:** Entirely clear, veins brown. The apical cell (R_5) is closed and bears a long petiole, petiole nearly equal to the length of vein R_4. The fork of veins R_4 and R_5 is situated beyond the middle of cell R_5. Crossvein r-m situated at apical three-fourths of discal cell. **Abdomen:** Rather broad and short, about three times longer than its greatest width; chiefly brownish black, with the apices of the terga and sterna narrowly white. All of the visible conjunctiva whitish; with sparse recumbent pile more abundant upon the sides. Apex of abdomen, genital portion, slightly enlarged.

Length: body, 5.3-6.0 mm.; wing, 4.0 mm.

Male.—Similar in most respects to the female. The head, excepting the red eyes, is chiefly brownish black with the front only yellow at or near the antennae; facial depression mostly white around the sides and dark in median portion. The front is narrowly separated above, the separation is less than the width of median ocellus. Thorax and legs somewhat more thickly haired, pile of abdomen more distinct. **Genitalia:** Not strongly swollen, the structures rather obscured in undissected specimens. The coxopodite is wider than long, rather sharply tapering on posterior median margin, the apex with a 'V' shaped cleft. The median portion of the coxopodite possesses a pair of comblike structures each made up of 12 to 13 strong spines arranged in a oblique row (fig. 13c). Clasping structures simple, folded inward in resting position and not visible except in direct end view; claspers curved outward (fig. 13d). Ninth tergum divided into two plates, these are much longer than wide and each terminate in a long slender apical lobe (fig. 13e). Cerci elongated, well developed.

Holotype, female, Riggins, Idaho, May 18, 1940 taken on **Pinus ponderosa** acc. No. 22070 Hopk. U. S. (T. Terrell). Allotype, male, and three paratypes, two males, two females, Prineville, Oregon, June 23, 1934, on

Pinus ponderosa, acc. No. 18960-75-a,b, Hopk. U. S. (W. J. Buckhorn). The holotype was reared from a log infested with **Monochamus** larvae, the allotype and paratypes were collected from trees killed by **Dendroctonus brevicomis** by placing fine mesh wire screens directly on the trunks of these trees and catching the insects in glass jars as they emerged. The larvae of this species are evidently predaceous upon bark beetles.

Holotype, allotype and two paratypes returned to U. S. National Museum, two paratypes retained in Snow Entomological Collections.

Belosta flaviceps (Coquillett)

Pseudatrichia flaviceps Coquillett, 1903, Proc. U. S. Nat. Mus, 25, 102.

This species is distinguished from other known **Belosta** by having the thorax thinly pilose, the pile being recumbent and sparse. The humeri and the front and face are yellow and the antennae are chiefly yellowish. The occiput is black except for the yellow sides.

Length 3 mm.

Type locality, Williams, Arizona. Type in U. S. National Museum.

The writer has not seen this species. Comparative notes on it and **B. pilosa** have kindly been supplied by Mr. C. T. Greene of the U. S. National Museum.

Belosta pilosa (Coquillett)

Pseudatrichia pilosa Coquillett, 1903, Proc. U. S. Nat. Mus., 25, 102.

The following descriptive notes were supplied by Mr. C. T. Greene. All hair on edge of mesonotum and pleurae long and white, pile in middle of mesonotum long, mixed black and white; in certain lights the posterior dorsal portion of mesonotum has two narrow streaks of golden pile, narrowly separated by the black pile. Halteres yellowish, with or without a brown infuscation. Thorax humped, the distance from the lateral suture to the top of the hump is equal to the width of the thorax from above. Abdominal segments 2-8 white on posterior and lateral edges.

Type locality, Williams, Ariz. Type in U. S. National Museum. The writer has not seen this species.

Omphralosoma Kröber

Omphralosoma Kröber, 1937, Stett. Ento. Zeit. 98, 219.

This genus is closely related to **Omphrale**, it is distinguished by the presence of scales on the body. In other respects they are very similar to some of the small species of **Omphrale**. This is the first report of an **Omphralosoma** from the Western hemisphere. According to Kröber[3] the genus has been known only from the genotype from Algiers.

Genotype, **Omphralosoma squamosa** (Villen).

Continued next issue

3 1937, Stett. Ento. Zeit., 98, 214.

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